IBM Personal System/2
Micro Channel SCSI Adapter

Installation Instructions

IBM

Note

Before using this information and the product it supports, be sure to read the general information under "Notices" on page viii.

© Copyright International Business Machines Corporation 1992. All rights reserved.
Note to U.S. Government Users — Documentation related to restricted rights — Use, duplication or disclosure is subject to restrictions set forth in GSA ADP Schedule Contract with IBM Corp.

Contents

Product Warranties iv

Notices viii
Trademarks and Service Marks viii
Electronic Emission Notices ix
Electrical Safety x

Who Should Use These Instructions xi

Product Description 1

Before You Begin 3
Installation Requirements 3
Special Tools 4
Security 4
Supporting More Than Two Hard Disk Drives 5

Overview 7

The New Reference Diskette in this Package 8

Using the Reference Diskette 10

Installing Option and Device Driver Diskettes 11

Handling the Adapter 12

The SCSI Adapter Terminator 13

Installation Procedure 15
Step 1. Removing the Computer Cover 15
Step 2. Choosing an Expansion Slot 16
Step 3. Installing the SCSI Adapter 16
Step 4. Installing the SCSI Devices 17
Step 5. Checking Your Work 19
Step 6. Completing the Installation 20

Solving Problems 21

© Copyright IBM Corp. 1992

One or More SCSI Adapters Already Installed 24

System-Board SCSI Interface 26

Determining Your Present Configuration 28

Maximum SCSI Cable Length 29

Product Warranties

International Business Machines Corporation Armonk, New York, 10504

Statement of Limited Warranty

This Statement of Limited Warranty applies to Machines you originally purchase for your use, and not for resale, from IBM or an IBM authorized reseller. The term "Machine" means an IBM machine, its features, conversions, upgrades, elements, or accessories, or any combination of them. Machines are subject to these terms only if purchased and located in the United States or Puerto Rico. If you have any questions, contact IBM or your reseller.

Machine: MICRO CHANNEL SCSI ADAPTER OR MICRO CHANNEL SCSI ADAPTER WITH CACHE, AS APPLICABLE

Warranty Period*: ONE YEAR

**Elements and accessories are warranted for three months. Contact your place of purchase for warranty service information.*

Production Status

Each Machine is manufactured from new parts, or new and serviceable used parts (which perform like new parts). In some cases, the Machine may not be new and may have been previously installed. Regardless of the Machine's production status, IBM's warranty terms apply.

The IBM Warranty

IBM warrants that each Machine 1) is free from defects in materials and workmanship and 2) conforms to IBM's Official Published Specifications. IBM calculates the expiration of the warranty period from the Machine's Date of Installation. The date on your receipt is the Date of Installation, unless IBM or your reseller informs you otherwise.

During the warranty period, IBM or your reseller will provide warranty service under the type of service designated for the Machine and will manage and install engineering changes that apply to the Machine. IBM or your reseller will specify the type of service.

For a feature, conversion, or upgrade, IBM or your reseller may require that the Machine on which it is installed be 1) the designated, serial-numbered Machine and 2) at an engineering-change level compatible with the feature, conversion, or upgrade. Some of these transactions (called "Net-Priced" transactions) may include additional parts and associated replacement parts that are provided on an exchange basis. All removed parts become the property of IBM and must be returned to IBM.

Replacement parts assume the remaining warranty of the parts they replace.

If a Machine does not function as warranted during the warranty period, IBM or your reseller will repair or replace it without charge. If IBM or your reseller is unable to do so, you may return it to your place of purchase and your money will be refunded.

If you transfer a Machine to another user, warranty service is available to that user for the remainder of the warranty period. You should give your proof of purchase and this Statement to that user.

Warranty Service

To obtain warranty service for the Machine, you should contact your reseller or call IBM at **1-800-IBM-SERV (426-7378)**. You may be required to present proof of purchase.

Depending on the Machine, the service may be 1) a "Repair" service at your location (called "On-site") or at one of IBM's or a reseller's service locations (called "Carry-in") or 2) an "Exchange" service, either On-site or Carry-in.

© Copyright IBM Corp. 1992

When a type of service involves the exchange of a Machine or part, the item IBM or your reseller replaces becomes its property and the replacement becomes yours. The replacement may not be new, but will be in good working order.

It is your responsibility to:

1. obtain authorization from the owner (for example, your lessor) to have IBM or your reseller service a Machine that you do not own;
2. where applicable, before service is provided —
   a. follow the problem determination, problem analysis, and service request procedures that IBM or your reseller provide,
   b. secure all programs, data, and funds contained in a Machine,
   c. inform IBM or your reseller of changes in a Machine's location, and
   d. for a Machine with exchange service, remove all features, parts, options, alterations, and attachments not under warranty service. Also, the Machine must be free of any legal obligations or restrictions that prevent its exchange; and
3. be responsible for loss of, or damage to, a Machine in transit in those cases where you are responsible for the transportation charges.

Extent of Warranty

IBM does not warrant uninterrupted or error-free operation of a Machine.

Misuse, accident, modification, unsuitable physical or operating environment, improper maintenance by you, or failure caused by a product for which IBM is not responsible may void the warranties.

THESE WARRANTIES REPLACE ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. HOWEVER, SOME LAWS DO NOT ALLOW THE EXCLUSION OF IMPLIED WARRANTIES. IF THESE LAWS APPLY, THEN ALL EXPRESS AND IMPLIED WARRANTIES ARE LIMITED IN DURATION TO THE WARRANTY PERIOD. NO WARRANTIES APPLY AFTER THAT PERIOD.

Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

Limitation of Liability

Circumstances may arise where, because of a default on IBM's part or other liability, you are entitled to recover damages from IBM. In each such instance, regardless of the basis on which you are entitled to claim damages, IBM is liable only for:

1. bodily injury (including death), and damage to real property and tangible personal property; and
2. the amount of any other actual loss or damage, up to the greater of $100,000 or the charge for the Machine that is the subject of the claim.

Under no circumstances is IBM liable for any of the following:

1. third-party claims against you for losses or damages (other than those under the first item listed above);
2. loss of, or damage to, your records or data; or
3. economic consequential damages (including lost profits or savings) or incidental damages, even if IBM is informed of their possibility.

Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

IBM Canada Ltd., Markham, Ontario L3R 2Z1

Statement of Limited Warranty — Canada

This Statement of Limited Warranty applies to Machines you originally purchase from IBM Canada Ltd. (IBM) or an IBM authorized or approved reseller for your use, and not for resale. The term Machine includes an IBM Machine, its features, conversions, upgrades, elements, and accessories, or any combination of them. Machines are subject to these terms only if purchased and located in Canada. If you have any questions, please contact IBM or your reseller.*

Machine: MICRO CHANNEL SCSI ADAPTER OR MICRO CHANNEL SCSI ADAPTER WITH CACHE, AS APPLICABLE

Warranty Period:** ONE YEAR

*** Elements and accessories are warranted for three months. Please contact your place of purchase for warranty service information.*

Production Status

Each Machine is manufactured from new parts, or new and serviceable used parts (which perform like new parts). In some cases, the Machine may not be new and may have been previously installed. Regardless of the Machine's production status, IBM's warranty terms apply.

The IBM Warranty

IBM warrants that each IBM Machine conforms to its Official Published Specifications and is free from defects in materials and workmanship. IBM calculates the expiration of the warranty period from the Machine's Date of Installation. The date on your receipt is the Date of Installation, unless IBM or your reseller tells you otherwise.

During the warranty period, IBM or your reseller will provide warranty service under the type of service designated for the Machine and manage and install engineering changes that apply to the Machine. IBM or your reseller will specify the type of service.

For a feature, conversion, or upgrade, IBM or your reseller may require that the Machine on which it is installed be the designated, serial-numbered Machine and at an engineering-change level compatible with the feature, conversion, or upgrade. Some of these transactions (called "Net-Priced" transactions) may include additional parts and associated replacement parts that are provided on an exchange basis. All removed parts become the property of IBM and must be returned to IBM.

Replacement parts assume the remaining warranty of the parts they replace, if any.

If the Machine does not function as warranted during the warranty period, IBM or your reseller will repair or replace it without charge. If IBM or your reseller is unable to do so, you may return it to your place of purchase and your money will be refunded.

If you transfer the Machine to another user, warranty service is available to that user for the remainder of the warranty period. You should give your proof of purchase and this Statement to that user.

Warranty Service

To obtain warranty service for the Machine, you should contact your reseller or call IBM at **1-800-465-6666**. You may be required to present your proof of purchase.

---

* *If you have signed an IBM Customer Agreement, this document is for your information only and the terms of your IBM Customer Agreement apply to this Machine.*

Depending on the Machine, the service may be a repair service at your location (called "On-site") or at one of IBM's or a reseller's service locations (called "Carry-in") or an exchange service, either On-site or Carry-in.

When a type of service involves the exchange of the Machine or part, the item IBM or your reseller replaces becomes its property and the replacement becomes yours. The replacement may not be new, but will be in good working order.

It is your responsibility to:

- obtain authorization from the owner to have IBM or your reseller service a Machine that you do not own;
- where applicable, before service is provided -
  - follow the problem determination, problem analysis, and service request procedures that IBM or your reseller provide,
  - secure all programs, data, and funds contained in a Machine,
  - inform IBM or a reseller of changes in a Machine's location, and
  - for a Machine with exchange service, remove all features, parts, options, alterations, and attachments not under warranty service. Also, the Machine must be free of any legal obligations or restrictions that prevent its exchange; and
- be responsible for loss of, or damage to, a Machine in transit in those cases where you are responsible for the transportation charges.

Extent of Warranty
IBM does not warrant uninterrupted or error-free operation of the Machine.

These warranties apply only if you use the Machine in the manner specified. They will have no legal effect if the Machine is misused, damaged by accident, modified, placed in an unsuitable physical or operating environment, maintained improperly by you, or caused to fail by a product for which IBM is not responsible.

These warranties replace all other warranties or conditions, express or implied, including, but not limited to, the implied warranties or conditions of merchantable quality and fitness for a particular purpose.

Limitation of Liability
Circumstances may arise where you are entitled to recover damages from IBM. In each such instance, IBM is liable for no more than:

1. damages for physical harm to persons caused by our negligence;
2. damages for physical harm to tangible personal property and real property caused by our negligence; and
3. any direct damages up to the greater of $100,000 or the charges paid for the Machine that is the subject of the claim.

Under no circumstances is IBM liable for any of the following:

- damages of third parties claimed against you (other than those under 1 on page vii and 2 on page vii above);
- harm to your records or data; or
- special, indirect or consequential damages (other than those under 1 on page vii above) including, but not limited to, lost profits, lost business revenue, or failure to realize expected savings, even if you informed IBM of their possibility.

This "Limitation of Liability" applies regardless of the basis on which you are entitled to claim damages from us, including but not limited to:

- breach of contract even if a fundamental breach, or
- tort, including but not limited to negligence or misrepresentation.

Your Additional Rights
You may have additional rights under certain laws that do not allow us to exclude implied warranties or conditions or to exclude or limit certain damages. If so, those limitations or exclusions may not apply to you.

Notices

References in this publication to IBM products, programs, or services do not imply that IBM intends to make these available in all countries in which IBM operates. Any reference to an IBM product, program or service is not intended to state or imply that only IBM's product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any of IBM's intellectual property rights or other legally protectible rights may be used instead of the IBM product, program, or service. Evaluation and verification of operation in conjunction with other products, programs, or services, except those expressly designated by IBM, are the user's responsibility.

IBM may have patents or pending patent applications covering subject matter in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to the IBM Director of Commercial Relations, IBM Corporation, Purchase, NY 10577.

Trademarks and Service Marks

The following terms, denoted by an asterisk (*), used in this publication, are trademarks or service marks of IBM Corporation in the United States or other countries:

AIX	IBM	Micro Channel
OS/2	Personal System/2	PS/2

Electronic Emission Notices

Federal Communications Commission (FCC) Statement

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult an IBM authorized dealer or service representative for help.

IBM is not responsible for any radio or television interference caused by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Canadian Department of Communications compliance statement

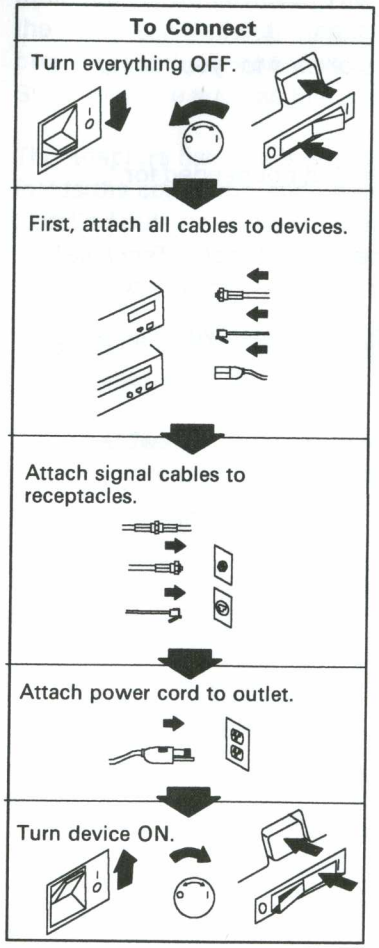
This equipment does not exceed Class B limits per radio noise emissions for digital apparatus, set out in the Radio Interference Regulation of the Canadian Department of Communications.

Avis de conformité aux normes du ministère des Communications du Canada

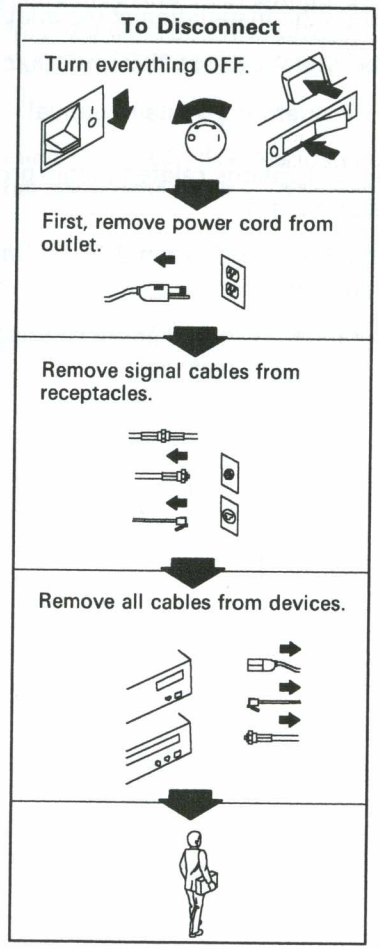
Cet équipement ne dépasse pas les limites de Classe B d'émission de bruits radioélectriques pour les appareils numériques, telles que prescrites par le Règlement sur le brouillage radioélectrique établi par le ministère des Communications du Canada.

Electrical Safety

DANGER:
Electrical current from power, telephone, and communication cables is hazardous. To avoid shock hazard, connect and disconnect cables as shown below when installing, moving or opening the covers of this product or attached devices. The power cord must be used with a properly-grounded outlet.


To Connect
Turn everything OFF.
First, attach all cables to devices.
Attach signal cables to receptacles.
Attach power cord to outlet.
Turn device ON.

Note: In the U.K., by law, the telephone cable must be connected after the power cord.


To Disconnect
Turn everything OFF.
First, remove power cord from outlet.
Remove signal cables from receptacles.
Remove all cables from devices.

Note: In the U.K., by law, the power cord must be disconnected after the telephone line cable.

Who Should Use These Instructions

This book is written for the person who will install and use the Micro Channel SCSI Adapter or Micro Channel SCSI Adapter with Cache.

Related Publications

In addition to this book, you might need the following books to complete the installation of the adapter:

- The *IBM Personal System/2 Quick Reference* for your computer
- Your operating-system manual.

Other publications related to this product (but not needed for installation) are:

- The *Personal System/2 Micro Channel SCSI Adapter Technical Reference*
- *Personal System/2 Micro Channel SCSI Adapter with Cache Technical Reference.*

© Copyright IBM Corp. 1992

Product Description

These instructions are for the IBM* Personal System/2* Micro Channel* SCSI Adapter or the IBM Personal System/2 Micro Channel SCSI Adapter with Cache. The adapter is a controller and an interface between an IBM Personal System/2 computer with Micro Channel architecture and up to seven Small Computer System Interface (SCSI) devices. The adapters meet the SCSI standard set by the American National Standards Institute (ANSI). This standard provides for the connection of up to seven SCSI devices to a single SCSI interface such as this adapter.

The adapters have an internal connector for SCSI devices installed inside the computer, and an external connector for SCSI devices installed outside of the computer.

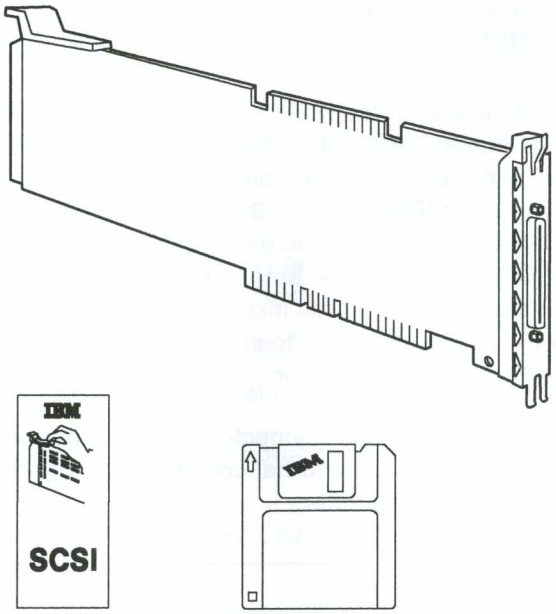
Important

Do not open the static-protective bag containing the adapter until instructed to do so.

The hardware drawings in this publication might look slightly different from your hardware.

* Trademark of the International Business Machines Corporation.

© Copyright IBM Corp. 1992



This option package contains:

- A Micro Channel SCSI Adapter or SCSI Adapter with Cache
- An adapter identification label
- New Reference Diskettes (for some PS/2* models).

Important

PS/2 models that have the system programs on a hard disk drive do not require a new Reference Diskette. If you are not sure if your model has the system programs on a hard disk drive, refer to the *Quick Reference* for your computer.

Contact the place of purchase if an item is missing or damaged.

* Trademark of the International Business Machines Corporation.

Before You Begin

Important

Some PS/2 options can be installed at the same time you set up your computer for the first time. However, the computer must be working, and your operating system installed, before you install this SCSI adapter.

Installation Requirements

You will need the *Quick Reference* for your computer.

If there is a new Reference Diskette *for your PS/2 model* included in the package with this adapter, and the new diskette has a higher version number than your present Reference Diskette, you also will need:

- Your old Reference Diskette
- The backup copy of your old Reference Diskette
- A blank 2MB capacity diskette that is not write-protected.

© Copyright IBM Corp. 1992

Special Tools

If you are connecting *both* internal SCSI devices (installed inside the computer) *and* external SCSI devices (installed outside the computer) to this adapter, a small flat-blade screwdriver is required to remove the terminator from the adapter.

Security

The system cover-lock, power-on password, and keyboard password help protect internal options from theft or use by unauthorized persons. To protect *data* stored on internal and external options from theft or use by unauthorized persons, additional security measures are required. Consult your IBM Sales Representative or your IBM Authorized Dealer for information on the security accessories that are available to meet your present and future needs.

Supporting More Than Two Hard Disk Drives

Important

Read this section only if your computer will have more than two hard disk drives after this installation, or if you plan to partition any of your hard disk drives.

The number of hard disk drives that your computer can support is determined by your operating system. If your operating system is not listed below, refer to your operating-system documentation or contact the place of purchase.

DOS 5.0 IBM Disk Operating System (DOS), Version 5.0, supports up to 24 partitions that the user can distribute over a maximum of seven hard disk drives. Two of the drives can be non-SCSI.

DOS 4.0 IBM DOS, Version 4.0, *with the installation of a Corrective Service Diskette (CSD),* supports up to 24 partitions that the user can distribute over a maximum of seven hard disk drives. Two of the drives can be non-SCSI. Contact the place of purchase to obtain CSD No. UR29015 (or the latest version of that CSD). This CSD also supports the labeling of a third diskette drive.

Important

DOS 4.0 and the CSD must be installed before connecting the third hard disk drive or third diskette drive.

DOS 4.0 *Without the installation of the CSD*, IBM DOS, Version 4.0, supports up to 24 partitions that the user can distribute over a maximum of two hard disk drives. One or both drives can be SCSI drives.

DOS 3.3 IBM DOS, Version 3.3, supports up to 24 partitions that the user can distribute over a maximum of two hard disk drives. One or both drives can be SCSI drives.

OS/2* Version 2.0 and **OS/2 Version 1.3** support up to 24 partitions that the user can distribute over a maximum of 24 hard disk drives. Two of the drives can be non-SCSI.

OS/2 Version 1.2 supports up to 24 partitions that the user can distribute over a maximum of 7 hard disk drives. Two of the drives can be non-SCSI.

For information on the IBM Advanced Interactive Executive Personal System/2 (**AIX* PS/2**), contact your IBM Marketing Representative or an IBM Authorized Dealer.

* Trademark of the International Business Machines Corporation.

Overview

The following is an overview of the steps you will take to install the Micro Channel SCSI adapter and the devices that you are now connecting to this adapter. Do not do any of these steps now.

1. If there is a new Reference Diskette for your PS/2 model in this package, and the new diskette has a higher version number than your present Reference Diskette, you will update your Reference Diskette and backup copy.
2. If any Option and Device Driver Diskettes came with the SCSI devices you are now connecting to this adapter, you will install that software.
3. If you are connecting both internal devices (installed inside the computer) and external devices (installed outside the computer) to this adapter now, you will remove the terminating resistor from the adapter.
4. You will remove the computer cover.
5. You will choose an expansion slot for adapter installation. If you already have one or more SCSI adapters installed in your computer, or if your computer has a system-board SCSI interface, you will read about additional considerations.
6. You will install the adapter inside the computer.
7. You will install the internal and external devices you plan to install at this time, and cable them to the adapter.
8. Prior to reinstalling the cover on the computer you will complete a checklist.
9. You will update the backup copy of the system programs.

© Copyright IBM Corp. 1992

The New Reference Diskette in this Package

Important

If a new Reference Diskette (for your model) is not included in this package, or if your old Reference Diskette is the same version level or higher than the Reference Diskette (for your model) that is included in this package, go to "Using the Reference Diskette" on page 10.

1. Get the new Reference Diskette (contained in this package) for your Personal System/2 model.
2. Compare the version number on your old Reference Diskette to the version number on the new Reference Diskette.
   - If the version number on your old Reference Diskette is the same or higher than the version number on the new diskette, discard the new diskette and continue with "Using the Reference Diskette" on page 10.
   - If the version number on your old Reference Diskette is lower than the version number on the new Reference Diskette, continue with step 3.
3. Get the following:
   - The backup copy of your old Reference Diskette
   - A blank 2MB capacity diskette that is not write-protected.
4. Get the backup copy of your old Reference Diskette and label it "Temporary Option Diskette."

© Copyright IBM Corp. 1992

5. Insert the new Reference Diskette into drive A. Turn on all attached devices, then turn on the computer.
   a. Follow the instructions on the screen and make a backup copy of the new Reference Diskette, using the blank 2MB diskette. Label the backup copy "New Reference Diskette Backup Copy." Store the original new Reference Diskette in the back of the *Quick Reference* for your computer.
   b. Insert the diskette labeled "New Reference Diskette Backup Copy" into drive A.
   c. Select **Copy an option diskette** from the Main Menu. When the instructions tell you to "insert your Option Diskette," insert the diskette labeled "Temporary Option Diskette" into drive A. This procedure copies information about the installed options from your old diskette to the new diskette. When the instructions on the screen tell you to "Insert your backup copy of the Reference Diskette," insert the diskette labeled "New Reference Diskette Backup Copy" into drive A.

      Note: You no longer need the diskette labeled "Temporary Option Diskette" or your old Reference Diskette. Before you discard them, note that the new Reference Diskettes in this package do not contain the tutorial **Learn about the computer**. If you think you will need to review the tutorial, keep your old Reference Diskette and label it "Tutorial Diskette." Do not use it for any purpose other than reviewing the tutorial. Note also that the old Reference Diskette will not start if three or more hard disk drives are attached to your computer.

   d. Turn off all attached devices. Then turn off the computer and remove the New Reference Diskette Backup Copy from drive A.

Using the Reference Diskette

The Reference Diskette contains *system programs* (utility programs) used to configure, test, restore, and update the computer. Some PS/2 computer models have the system programs on both the Reference Diskette and on a hard disk drive. The programs are preinstalled in a protected partition called the "system partition" on the hard disk drive.

Note: If you are not sure whether the system programs reside on your hard disk drive, or if you are not sure how to gain access to the Main Menu of the system programs on the hard disk drive, refer to the *Quick Reference* for your computer.

If your model has the system programs on a hard disk drive, you are not required to use the backup copy of your Reference Diskette as described in these instructions. However, keep an up-to-date backup copy of the system partition. This backup copy can be used if the computer cannot be started from the system programs on the hard disk drive. A backup copy should be made after installing any option.

You must use the backup copy of your Reference Diskette if the system programs are not on a hard disk drive.

© Copyright IBM Corp. 1992

Installing Option and Device Driver Diskettes

Some SCSI devices are shipped with diskettes called option diskettes or option/device driver diskettes. Most SCSI hard disk drives do not require these diskettes. Most SCSI devices other than hard disk drives, such as CD-ROMs, optical disk drives, streaming tape drives, and printers require an option diskette.

Check for option diskettes in the packages containing SCSI devices that you will be connecting to this SCSI adapter. Also check the publications that came with those devices. If any diskettes were included, follow the instructions for using those diskettes and install that software now.

© Copyright IBM Corp. 1992

Handling the Adapter

Warning: Static electricity can damage the adapter if these handling instructions are not followed.

Read the following precautions *before* you remove the adapter from the static-protective bag:

- Do not touch any exposed printed circuitry.
- Do not place the adapter on the computer cover or on a metal table.
- Prevent other people from touching the adapter.
- Limit your movement, because movement can cause static-electricity buildup.
- Always handle the adapter carefully and by the edges.
- Always place the adapter on the static-protective bag, on a flat surface, until the adapter is installed.

Determine your next step:

You will need to know the location of the metal expansion-slot covers on your computer. If you need to, refer to the *Quick Reference* for your computer for that information. Otherwise, continue with these instructions.

Complete the following steps in order.

1. Touch the static-protective bag containing the adapter to a metal expansion-slot cover. This reduces any static electricity from the package and from your body.
2. Remove the adapter from the static-protective bag, holding the adapter by the edges.
3. Place the adapter on the bag, on a flat surface.
4. Get the adapter identification label that is included with these instructions. Refer to the illustration on the label, then peel off and attach the "SCSI" label to the adapter, as shown.

© Copyright IBM Corp. 1992

The SCSI Adapter Terminator

Determine your next step:

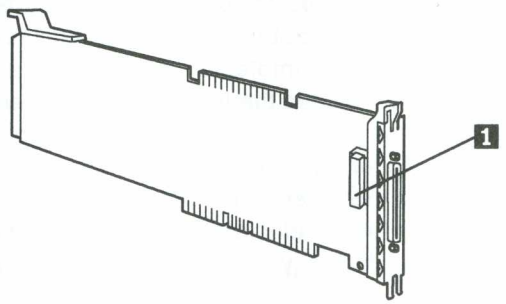
The adapter is shipped with a terminating resistor (terminator) in place. The terminator must be removed *only* if you connect *both* internal SCSI devices (installed *inside* the computer) *and* external SCSI devices (installed *outside* the computer) to this adapter.

Are you connecting *both* internal and external SCSI devices to this adapter now?

No	Do not remove the terminator. Go to "Installation Procedure" on page 15.
Yes	Continue with step 1 below.

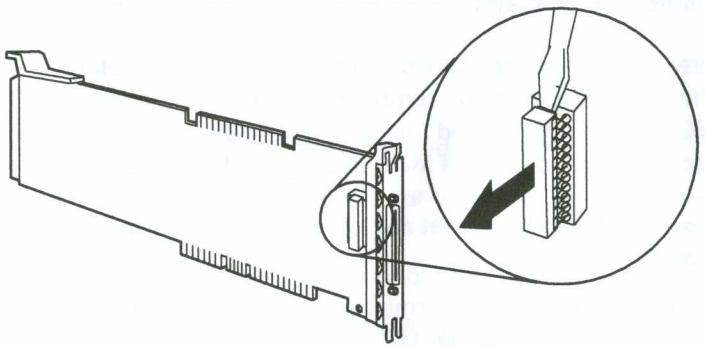
Warning: The adapter can be damaged if the following instructions are not followed carefully. Pay close attention to the placement of the screwdriver.

1. Locate the terminator **1** on the SCSI adapter. "T-RES" is printed on the adapter, just above the terminator.



© Copyright IBM Corp. 1992

2. Carefully insert a small screwdriver between the terminator and the socket, then slowly twist the screwdriver. When the end of the terminator rises, repeat the operation on the other end. Remove the terminator. Set the adapter down on the static-protective bag.



Note: Store the terminator in a safe place. You might need it should your configuration change in the future.

Important

Earlier versions of the adapter required an external terminator, the IBM Personal System/2 SCSI Adapter External Terminator, when no external devices were connected to the adapter. That External Terminator (purchased separately) is not required with this new adapter. *However*, if you have one or more internal drives connected to the adapter, and you *periodically* connect one external SCSI drive (for example, to backup your hard disk drives onto tape), you *must* remove the terminator mounted on the new adapter as instructed on this page. In that case, you must install the SCSI Adapter External Terminator when you *remove* the external drive from the external connector of the adapter. This will eliminate the need to reinstall the "T-RES" terminator onto this new adapter each time you disconnect the external drive from the adapter.

Contact the place of purchase to order the IBM Personal System/2 SCSI Adapter External Terminator.

Installation Procedure

Determine your next step:

If this is the first SCSI adapter to be installed in your computer, continue with "Step 1. Removing the Computer Cover" below.

If you are not sure about your configuration, go to "Determining Your Present Configuration" on page 28.

If your computer already has one or more SCSI adapters installed, but does not have a system-board SCSI interface, go to "One or More SCSI Adapters Already Installed" on page 24.

If your computer has a system-board SCSI interface, go to "System-Board SCSI Interface" on page 26.

Step 1. Removing the Computer Cover

Important

If you need instructions for removing the power cord and cables or the computer cover, refer to the *Quick Reference* for your computer.

a. If you have not already done so, turn off all attached devices. Then turn off the computer.

b. Disconnect the power cord and cables.

c. Remove the cover.

© Copyright IBM Corp. 1992

Step 2. Choosing an Expansion Slot

The expansion slots are the connectors on the system board, inside your computer, that the connector on the bottom of the adapter fits into. For more information refer to the *Quick Reference* for your computer. Otherwise, continue with these instructions.

Prior to installing this adapter you will choose an expansion slot in which to install this adapter, based on your present configuration and the following information:

- The Micro Channel SCSI Adapter with Cache must be installed in a standard 32-bit slot for optimum performance.
- All Micro Channel SCSI adapters must be installed in a standard 32-bit slot if your computer has more than 16MB (MB = 1,048,576 bytes) of memory.
- All Micro Channel SCSI adapters can be installed in a standard 16-bit or a standard 32-bit slot if your computer has 16MB of memory or less.

The *Quick Reference* for your computer has more information about the types of expansion slots in your computer and how to identify each type. Use the following measurements to help identify a standard 16-bit or 32-bit slot:

- A standard 16-bit slot is approximately 75 mm (3 in.) long.
- A standard 32-bit slot is approximately 125 mm (5 in.) long.

Step 3. Installing the SCSI Adapter

Refer to your computer *Quick Reference* for adapter installation instructions. Install the adapter in the expansion slot that you selected based on your present configuration and the information on page 16 in this publication.

Important

Do not reinstall the computer cover and do not plug any computer power cords into electrical outlets at this time.

Step 4. Installing the SCSI Devices

Notes:

1. If three or more *external* SCSI devices will be connected to this adapter, go to "Maximum SCSI Cable Length" on page 29. Then return here.
2. Some internal devices might require an installation kit that includes a cable and mounting hardware. Contact your place of purchase to determine your requirements. If a kit is required, do the instructions that came with the device first. Then do the instructions that came with the kit.

Important

To install the SCSI devices, begin with the instructions that came with your SCSI devices. You will also use the *Quick Reference* for your computer. *Disregard the steps that tell you to turn on or start your computer, or to reinstall the computer cover. Do not reinstall the computer cover until instructed to do so in Step 6 in these instructions.* Instead, pay particular attention to the steps that tell you:

- How to set the SCSI identification number (ID) on each device.
  - SCSI IDs range from a high of 6 to a low of 0.
    - Hard disk drives should be given the highest SCSI IDs, such as 6 or 5. Refer to the instructions that came with other types of devices for the suggested ID setting.
    - Each device connected to the same adapter must have a *different* SCSI ID.
- How to remove the terminators from an internal device and when it is necessary to do so.

Installing External SCSI Devices

Complete the instructions that came with each external device or storage enclosure. Cable the external devices to the external connector of the SCSI adapter. If you have only one external device, it must be terminated. If you have more than one external device, the last device in the chain (the device farthest from the SCSI adapter) must be terminated.

Installing Internal SCSI Devices.
Refer to the instructions that came with each device and observe the following:

- If you are connecting only one internal device to the adapter, do not remove the terminators from that device. Connect that drive to the SCSI cable connector farthest from the adapter.
- If you are connecting more than one internal SCSI device to the adapter, remove the terminators from all internal devices *except* the device that will be connected to the *last* SCSI cable connector (the connector farthest from the adapter, on the end of the internal SCSI cable).
- If a kit is required for your model, follow the instructions that came with the kit.

Refer to the *Quick Reference* for your computer to:

a. Install the drives in the computer.

b. If you have not done so, connect the SCSI devices to the adapter. Follow the cabling instructions in the *Quick Reference* for your computer or the instructions supplied with any required kit.

c. Make sure all cables are connected properly and are firmly seated.

Important

Do not reinstall the computer cover until all SCSI devices have been properly connected to the adapter and the checklist in Step 5 has been completed.

Step 5. Checking Your Work

Be sure that your installation meets the following requirements:

☐ Each SCSI device connected to the same adapter is set to a different SCSI ID.

☐ If you have only one internal device it is terminated. If your SCSI cable has more than one connector, the single device is attached to the last connector, at the end of the cable, farthest from the SCSI adapter.

☐ If you have more than one internal device, the device attached to the cable connector farthest from the SCSI adapter is terminated.

☐ If you have only one external device, it is terminated.

☐ If you have more than one external device, the last device in the chain (the device farthest from the SCSI adapter) is terminated.

☐ If you have both internal and external devices connected to the same adapter, you have removed the terminator from the adapter.

☐ The cabling is correct and no options or cables loose. The power cables are connected to the devices.

☐ If your PS/2 model has the system programs on a hard disk drive, that drive must be set to SCSI ID 6. You can change the startup sequence of the drives in those models. Refer to the computer *Quick Reference* for instructions.

In models that do not have the system programs on a hard disk drive, the hard disk drive used to start your computer must have the highest SCSI ID of all devices connected to that adapter.

IMPORTANT: If you have more than one SCSI adapter installed, and you use a SCSI hard disk drive to start your computer, that drive must be connected to the SCSI adapter installed in the lowest-number expansion slot. If your computer has a system-board SCSI interface, the drive used to start the computer must remain connected to the system-board SCSI interface.

Step 6. Completing the Installation

a. Reinstall the computer cover. Refer to the *Quick Reference* for your computer if necessary.

b. Reconnect all cables and cords. Then plug all computer power cords into electrical outlets. For information on cable connections, refer to the *Quick Reference* for your computer and to the instructions that came with your external devices and external cables.

c. If your system programs are on a hard disk drive, turn on all attached devices. Then turn on the computer and go to the Main Menu of the system programs. Otherwise, insert the backup copy of the Reference Diskette into drive A. Turn on all attached devices, then turn on the computer.

d. Follow the instructions on the screen to run the automatic configuration program. Continue with the next step when you receive the following message:

```
Automatic Configuration is complete.
```

Note: If you experience a problem, go to "Solving Problems" on page 21.

e. Remove your backup copy of the Reference Diskette from drive A, if you used it, and continue with step f.

If you did not use a backup copy of the Reference Diskette, go to the Main Menu of the system programs. Create a backup copy of the System Partition (or update an existing backup copy) as follows:

Select **Backup/Restore system programs**, then select **Backup the System Partition** to copy the system programs from the System Partition to a diskette.

f. Turn off any attached devices, then turn off the computer.

Solving Problems

If you have any problems after installation:

- Be sure you have installed any software that was included on an option or device driver diskette supplied with your SCSI devices. See "Installing Option and Device Driver Diskettes" on page 11 for more information.
- Be sure you have run the automatic configuration program.
- Be sure you have completed all appropriate items in the checklist provided in "Step 5. Checking Your Work" on page 19.
- If you are using an expanded or enhanced-memory manager, such as the DOS Expanded Memory Specification (EMS) driver, go to "Resolving Memory-Address Conflicts" on page 22.

If you continue to have problems, refer to the solving computer problems section in the *Quick Reference* for your computer.

© Copyright IBM Corp. 1992

Resolving Memory-Address Conflicts

The automatic configuration program could change the memory-address space used by some hardware and software options. The new address could conflict with addresses defined for use through EMS. (EMS memory is used only in the DOS environment.)

If a memory conflict exists, one or more of the following could occur:

- The computer cannot load the operating system
- The computer does not function
- An application does not operate or returns an error
- Screen messages indicate that a memory-address conflict exists.

You can resolve memory-address conflicts in one of two ways:

- Change the software configuration
- Change the system configuration.

Changing the Software Configuration

The best method of resolving memory-address conflicts is to change the software configuration by changing the addresses defined by the EMS driver.

For conflicts caused by XMA2EMS (DOS 4.0) or EMM386 (DOS 5.0) in the CONFIG.SYS file, refer to your DOS documentation. For conflicts caused by an expanded-memory manager other than the one supplied with DOS, refer to the documentation supplied with the memory manager.

Notes:

1. If the system programs are on your hard disk drive, use the display memory map program to view the addresses used by your hardware and software options. See the *Quick Reference* for your computer for more information.
2. If the system programs do not reside on your hard disk drive, use the view configuration program on the Reference Diskette to view the addresses used by your hardware options only. See the *Quick Reference* for your computer for more information.

Changing the System Configuration

An alternate method of resolving memory-address conflicts is to change the address of the conflicting hardware option by using the change configuration program. (See the *Quick Reference* for your computer for more information.) Before changing adapter addresses, identify the addresses used by the EMS device driver. Then set the adapter to addresses that do not conflict.

Important

These conflicts can occur because the automatic configuration program sets up only the computer. It does not consider the operating system or application requirements. If you run the automatic configuration program after changing an address, the address you changed will be set back to its default value.

One or More SCSI Adapters Already Installed

If your computer has one or more SCSI adapters already installed, *but does not have a system-board SCSI interface,* read the following information.

The operating system (DOS or OS/2) assigns a letter to each drive in the computer (such as drives C, D, and so on). If your computer will have more than one SCSI adapter, it is important that you understand how your drives will be lettered. You must also understand the importance of the expansion slot that you choose for each adapter.

Note: DOS and OS/2 allow you to create multiple partitions within the same hard disk drive. These operating systems then assign a letter to each partition. For more information on partitions and how letters are assigned to each partition, refer to your operating system documentation or contact the place of purchase. For this discussion, the assumption is that you *do not* create multiple partitions in any hard disk drives.

After reading this information, you will select an expansion slot in which to install this adapter. Each expansion slot is numbered. *When you have more than one SCSI adapter, the drives connected to the adapter in the expansion slot having the lowest number receive the lowest available drive letters.* The SCSI IDs of the drives connected to each adapter also determine the letter assigned to each drive. *The drive with the highest ID receives the lowest available drive letter.*

Examples

If the SCSI IDs for four drives connected to an adapter in expansion slot 1 are 6, 5, 4, and 3, the drives would receive the letters C, D, E, and F respectively.

If you have two SCSI adapters, installed in expansion slots 1 and 4, and each adapter had two drives connected, the drive letters will be as follows:

- The drives connected to the SCSI adapter in slot 1 (the lower-number slot) will be drives C and D. (The drive with the highest ID is C.)
- The drives connected to the SCSI adapter in slot 4 will be drives E and F. (The drive with the highest ID is E.)

Note: If, in this example, you connected a third drive to the adapter in slot 1, the third drive (assuming it had a lower ID than the two drives previously connected to that adapter) will be drive E. The two drives connected to the adapter in slot 4 will then become drives F and G.

If, instead, you connected the third drive to the adapter in slot 4, and the third drive had an ID lower than the two other drives, the third drive would be drive H. The previously installed drives would all retain the original drive letters.

Important

If your computer has SCSI hard disk drives only (no non-SCSI hard disk drives), the hard disk drive used to start your computer (usually drive C) must be connected to the SCSI adapter installed in the lowest-number expansion slot of all the SCSI adapters. That drive should be set to ID 6. For example, if you have a SCSI adapter in slot 7, and you plan to install the second adapter in slot 8, hard disk drive C must be connected to the adapter in slot 7. If you installed a third SCSI adapter in slot 6, hard disk drive C must be connected to the new adapter installed in slot 6. Also, drive C must have a higher ID (preferably 6) than any other device connected to the adapter installed in slot 6.

If your computer has both SCSI and non-SCSI hard disk drives, the non-SCSI drive that was drive C will remain drive C and will continue to be the drive used to start your computer. If you have a second non-SCSI drive, it will be drive D, and your first SCSI drive will be drive E. Otherwise, if you had only one non-SCSI drive, your first SCSI drive would be drive D.

Go to "Step 1. Removing the Computer Cover" on page 15. When you get to "Step 2. Choosing an Expansion Slot" on page 16, choose an expansion slot based on the information you just read.

© Copyright IBM Corp. 1992

System-Board SCSI Interface

If your computer has a SCSI interface built-in to the system board read the following information.

The operating system (DOS or OS/2) assigns a letter to each drive in the computer. If you are installing one or more SCSI adapters in addition to the system-board SCSI interface, it is important that you understand how your drives will be lettered.

Note: DOS and OS/2 allow you to create multiple partitions within the same hard disk drive. These operating systems then assign a letter to each partition. For more information on partitions and how letters are assigned to each partition, refer to your operating system documentation or contact the place of purchase. For this discussion the assumption is that you *do not* create multiple partitions in any hard disk drives.

The drives connected to the system-board SCSI interface receive the lowest available drive letters (such as drive C and drive D), in alphabetical order, based on the ID of the drive. The computer was shipped with a hard disk drive set to ID 6, which is drive C. The drive with the next highest ID, for example ID 5, will be drive D, and so on.

If you have one SCSI adapter in addition to the system-board SCSI interface, the drives connected to the adapter will be assigned the next available letters (in alphabetical order) based on the SCSI ID (the highest ID, for example 6, receives the next available letter) *after* letters have been assigned to drives connected to the system-board SCSI interface.

For example, assume you had two hard disk drives, drive C and drive D, connected to your system-board SCSI interface. You then add an additional SCSI adapter and connect three external hard disk drives. You set the SCSI IDs to 6, 5, and 4 on the external drives. The drive set to ID 6 will be drive E. The drive set to ID 5 will be drive F, and the drive set to ID 4 will be drive G.

If you have more than one SCSI adapter in addition to the system-board SCSI interface, the *number of the expansion slot that each SCSI adapter is installed in* determines which drives receive the

© Copyright IBM Corp. 1992

next available letters. Drives connected to the adapter installed in the expansion slot having the lowest number will receive the next available letters. The drive with the highest ID (6) will receive the next available letter (in alphabetical order) *after* letters have been assigned to drives connected to the system-board SCSI interface *and* to drives connected to SCSI adapters installed in lower-numbered slots.

For example, if you had two drives (drive C and drive D) connected to the system-board SCSI interface, and SCSI adapters in expansion slots 1 and 4 (each with two drives connected) the drive letters will be as follows:

- The drives connected to the SCSI adapter in slot 1 (the lower-numbered slot) will be drives E and F.
- The drives connected to the SCSI adapter in slot 4 will be drives G and H.

Note: If, in this example, you connected an additional drive to the adapter in slot 1, the additional drive (assuming it had a lower ID than the other two drives previously connected to that adapter) will be drive G. The two drives connected to the adapter in slot 4 will then become drives H and I.

If instead, you connected the additional drive to the adapter in slot 4, and the additional drive had an ID lower than the two other drives, the additional drive would be drive I. The previously installed drives would all retain the original drive letters.

In summary, letters are assigned first to the drives connected to the system-board SCSI interface (highest ID gets the next letter), and then to the drives connected to SCSI adapters, starting with the adapter installed in the lowest-number expansion slot.

The hard disk drive containing the system programs (also used to start your computer) must be set to ID 6.

Go to "Step 1. Removing the Computer Cover" on page 15. When you get to "Step 2. Choosing an Expansion Slot" on page 16, choose an expansion slot based on the information you just read.

Determining Your Present Configuration

If you have at least one SCSI adapter already installed in your computer, or if your computer has a system-board SCSI interface, or if you are not sure, take the following steps:

1. If the system programs for your model are on a hard disk drive, turn on all attached devices. Then turn on the computer and go to the Main Menu of the system programs. Otherwise, insert the backup copy of the Reference Diskette into drive A. Turn on all attached devices, then turn on the computer.
2. Select **Set configuration** from the Main Menu, then select **Set and view SCSI device configuration**.

   The SCSI ID for each installed SCSI device appears on the line that begins with `Device Address`. The ID appears in a set of two numbers separated by a comma (for example: `6, 0`). The first number (in this example 6) is the ID assigned to the installed SCSI device.
3. Use Print Screen to record (or write down) the ID for each installed SCSI device, and the expansion slot number of its SCSI adapter. Computers with a system-board SCSI interface do not show a slot number, but show the SCSI ID for the system-board SCSI. If you have no external SCSI devices installed, any device listed here is an internal device.

   If there are no SCSI devices connected to a SCSI adapter, the screen will show only the number of the expansion slot of the SCSI adapter and its ID.
4. Turn off all attached devices. Then turn off the computer and remove the backup copy of your Reference Diskette, if you used it.
5. If your computer does not have SCSI adapters already installed, go to "Step 1. Removing the Computer Cover" on page 15.

   If your computer does not have a system-board SCSI interface but does have one or more SCSI adapters already installed, go to "One or More SCSI Adapters Already Installed" on page 24.

   If your computer has a system-board SCSI interface, but does not have any SCSI *adapters* yet installed, go to "System-Board SCSI Interface" on page 26.

© Copyright IBM Corp. 1992

Maximum SCSI Cable Length

The American National Standards Institute (ANSI) SCSI specification for the SCSI cable length connected to *each* SCSI interface is a maximum of six meters (approximately 19.7 feet). This includes internal (inside the computer or external device) as well as external cables (outside the computer or external device). The length of the SCSI cable inside a computer or external device varies, as does the length of external SCSI cables. Therefore, the number of external devices that can be connected to a single SCSI interface depends on the model of your PS/2 computer and your SCSI configuration.

If you are connecting *only external devices* to a SCSI adapter, (no internal devices will be connected to the same SCSI adapter), do not include the measurement for an internal cable in your calculation.

The following table shows the SCSI cable length, in meters, for the PS/2 computer models, storage enclosures, and cables listed.

	Length (Meters)
PS/2 Models 65 and 80 (internal cable)	1.0
PS/2 Model 90 (internal cable)	1.3
PS/2 Model 95 (internal cable)	1.5
SCSI Storage Enclosure, Model 3510 (internal cable)	0.3
External Storage Enclosure For SCSI Devices, Model 3511 (internal cable)	1.3
SCSI Card To Option Cable (60 to 50-pin external cable)	1.5
SCSI Option To Option Cable (50 to 50-pin external cable)	0.7
PS/2 3532 Drive (tape drive, internal cable)	0.06
SCSI Controller Cable (for 3532), 60 to 50-pin dual conn. (external cable)	1.5
SCSI Device-to-Device Cable (for 3532), 50 to 50-pin dual (external cable)	0.66

For models not listed refer to the *Quick Reference* for your computer.

© Copyright IBM Corp. 1992

Example: If you had a PS/2 Model 95 and planned to install three SCSI Storage Enclosures, your calculation would be as follows:

	Length (Meters)
PS/2 Model 95	1.5
3 - SCSI Storage Enclosures (Model 3510)	.3 X 3 = .9
1 - SCSI Card To Option Cable (60 to 50-pin, external)	1.5
2 - SCSI Option To Option Cable (50 to 50-pin, external)	.7 X 2 = 1.4
Total Length in Meters	**5.3**

5.3 meters is within the ANSI SCSI specification of six meters (maximum) for SCSI cable length. However, adding a fourth SCSI Storage Enclosure would add an additional 0.3 meters for the enclosure, plus 0.7 meters for the additional 50 to 50-pin cable, for a total of 6.3 meters. That total cable length exceeds the maximum.

Return to "Step 4. Installing the SCSI Devices" on page 17.

Part Number: 91F9393

Printed in U.S.A.